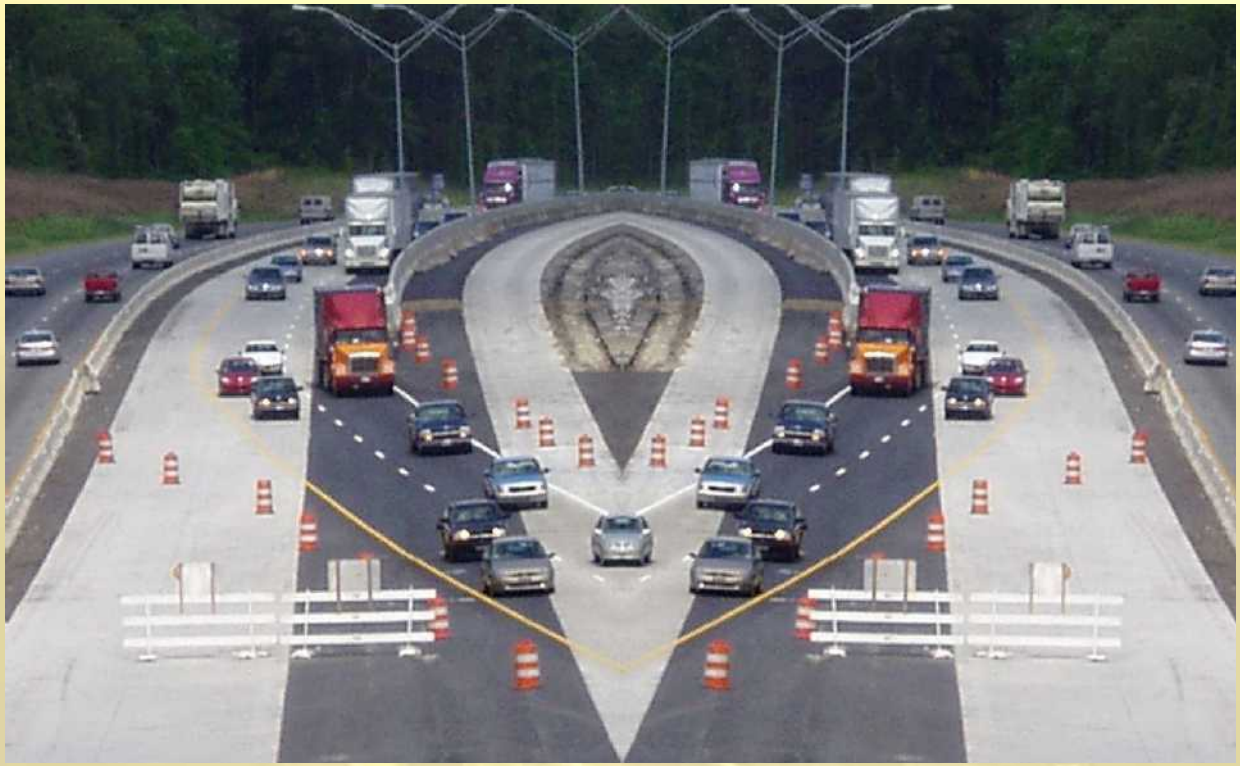
Traffic Engineering Conference

Wilmington, NC August 23-25

Design-Build and Traffic Control



Alternative Delivery Unit

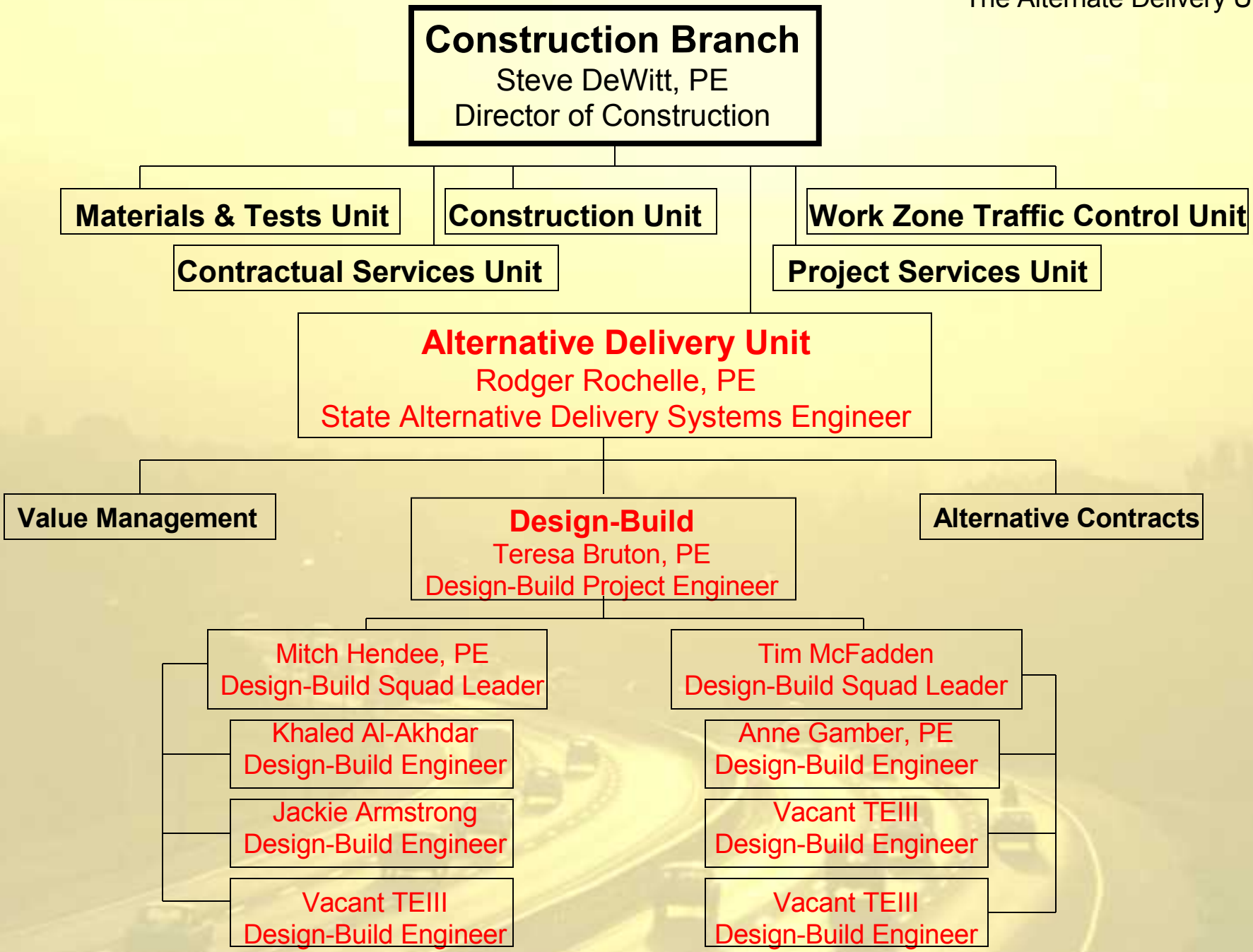
Design-Build Section

Mitch Hendee, PE

(919) 250-4128

Synopsis of this presentation

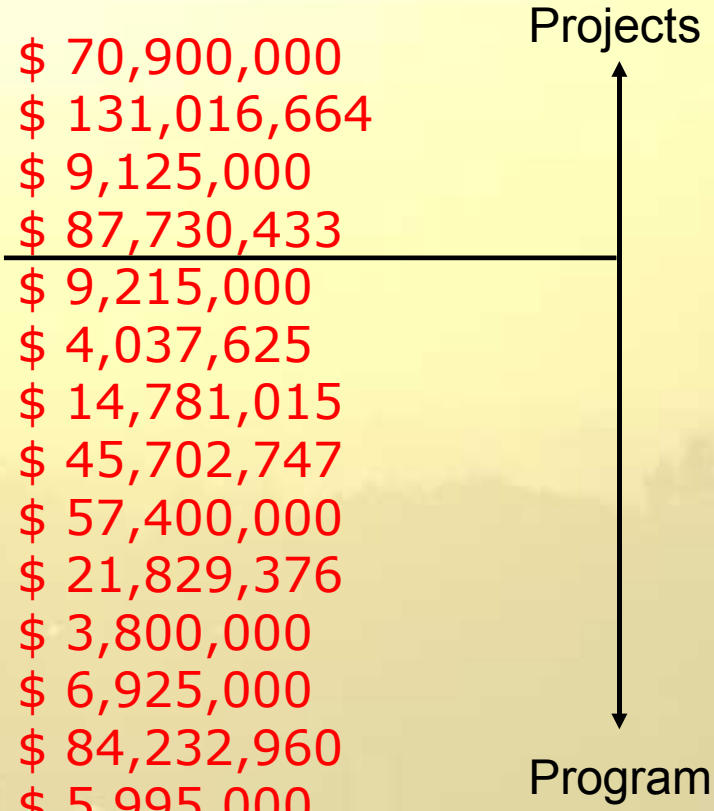
- The Alternate Delivery Unit
- Statistics on Design-Build Projects
  - R-2510B
- Nested Design-Build
- Traffic Engineering Branch and Design-Build
- Traffic Control and Design-Build
- Key Projects
  - U-3101C
  - I-4401
  - I-2511CB


Construction Branch
Steve DeWitt, PE
Director of Construction
Materials & Tests Unit
Construction Unit
Work Zone Traffic Control Unit
Contractual Services Unit
Project Services Unit
Alternative Delivery Unit
Rodger Rochelle, PE
State Alternative Delivery Systems Engineer
Value Management
Design-Build
Teresa Bruton, PE
Design-Build Project Engineer
Alternative Contracts
Mitch Hendee, PE
Design-Build Squad Leader
Khaled Al-Akhdar
Design-Build Engineer
Jackie Armstrong
Design-Build Engineer
Vacant TEIII
Design-Build Engineer
Tim McFadden
Design-Build Squad Leader
Anne Gamber, PE
Design-Build Engineer
Vacant TEIII
Design-Build Engineer
Vacant TEIII
Design-Build Engineer

Awarded Design-Build Projects

Let Prior to March of 2006

I-3311A	$ 70,900,000
R-2547	$ 131,016,664
I-3807	$ 9,125,000
I-3803A	$ 87,730,433
B-3174, B-3272	$ 9,215,000
B-3463, B-3647, B-3648	$ 4,037,625
R-2248F	$ 14,781,015
R-2641	$ 45,702,747
U-3101C	$ 57,400,000
U-3311B	$ 21,829,376
HAYWOOD COUNTY	$ 3,800,000
B-3851	$ 6,925,000
I-2511CB	$ 84,232,960
I-3311D	$ 5,995,000
R-2404A	$ 62,828,888
I-4401	$ 42,900,000
R-2510B	$ 192,040,143



Total $ 850,459,851

1.8% above the engineers estimate for all of these projects

Near Term Design-Build Projects

2006-07 Projected Let Projects

R-4463B	$ 24,700,000
I-2808A	$ 60,900,000
R-2813B	$ 32,400,000
R-2616	$ 39,700,000
B-3637, B-3835	$ 24,400,000
I-2810	$26,600,000
SubTotal	$ 208,700,000

Beyond 2007 Design-Build Projects

B-2500

U-4909

R-2632AA

U-2826A

U-2826B

I-3819

B-4214

U-2827B

R-2510B

- R-2510B, Washington Bypass ~$190 million, 2.8 mile long bridge over mostly wetlands and the Tar River.
- Work to start in February of 2007

R-2510B Design-Build

Design

- Roadway, Bridge (2.8 miles), Geotechnical, Signing, Traffic Control, Hydraulics, On-Site Mitigation, Signals, Erosion Control, Public Information, Archeological Data Recovery, Geoenvironmental (EPA Superfund site)

Merger Process (4B/4C)

Permit Application

- 404
- 401
- CAMA Major Development
- US Coast Guard
- FEMA
- State Stormwater
- NW6
- CCPCUA Permit
- Riparian Buffer Certification

ROW Acquisition

Utility Relocation

Railroad Coordination

Construction

Other ways Design-Build is being used

- Besides the Design-Build Projects shown earlier, "**Nested Design-Build**" has been used on a few Design-Bid-Build projects.
- The Nested Design-Build portion is paid by lump sum.
- The remaining items of the contract are handled under Design-Bid-Build requirements.
- This tool has been used on I-3605 and R-513C to let the Contractor hire a firm to design the Traffic Control plan or portion of it.

Design-Build and Traffic Engineering

- The **Regional Traffic Engineers** (RTE) have been a great help in establishing rules for recommending the need for Speed Reduction and Speeding Penalty Ordinances in the Traffic Control Scope of Work.
- Also the **RTE**s help review TC and PM submittals.
- **The Congestion Management Section** has been a useful resource with reviewing proposed designs by Design-Build Teams.
- **Safety Evaluation Group** has helped provide accident report information on U-3101C.
- **Signals and Geometrics Unit and the ITS section** provide scopes of work and review submittals for Design-Build Projects.

What I do for the Design-Build Section

- I help write the Traffic Control scope of work, coordinate and review other scopes of work.
- I help review man-day and quantity estimates for the engineers estimate related to traffic control.
- I review traffic control and pavement marking submittals and help review roadway and other submittals.
- I visit project sites, meet with the Contractor, Resident Engineer and Design Firm to help resolve traffic control issues.
- Besides Traffic Control and Pavement Marking issues, I've been involved with roadway reviews, the permitting process, municipal agreements and meeting with local governments to explain project information and answer questions.

What I do for the Design-Build Section

- When needed, I work with the Work Zone Traffic Control Unit with policy or guidelines that they are revising.
- Handling a lot of calls from the public, especially with the R-2510B Washington Bypass project.
- As the Project Manager for U-3101C and R-2510B, I have to help coordinate a lot of different meetings to ensure that the project stays on course.
- I also assist the Alternative Contracts Section with any Traffic Control related issues, such as the Bonner Bridge (B-2500) project.

What I do for the Design-Build Section

- In the two years I've been with the Design-Build section I have wrote traffic control scopes of works for at least 15 different projects and reviewed TC/PM plans for at least 10 different projects.
- I've reviewed over 80 different submittals for Traffic Control and Pavement marking plans.
- I've handled over 300 submittals and tracked their progress to ensure they were completed in the 10 day requirement.
- I've attended partnering meetings on 4 different projects and many weekly construction and design progress meetings for Design-Build projects

Design-Build and Traffic Control

- After the Design-Build Section was established in the Spring of 2004, all Traffic Control and Pavement Marking plans are now reviewed by the Design-Build Section.
- Prior to the Design-Build Section being established, the Resident Engineer's office reviewed Traffic Control plans due to the quick turn around needs of the field office and contractors.
- Some General Notes and Intermediate Contract time documents have been revised as a result of Design-Build projects.

Design-Build and Traffic Control

- The Traffic Control Scope of Work refers to the Work Zone Traffic Control Web site to ensure plans are developed following the same standard Design-Bid-Build Projects are produced.
- The Traffic Control Scope of Work is developed by the Design-Build Section, Division, RTE and WZTC Unit.
- The Question and Answering sessions with each team act like External Constructability/Value Engineering sessions.

Design-Build and Traffic Control Pre-Let Process

- Prior to the contract being awarded, the teams have to provide a Technical Proposal that explains how they will design and build the project.
  - I spend a good amount of time reviewing each proposal to see how well they followed the contract requirements.
  - I provide a summary to the five members of the selection committee that will score each team.

Design-Build and Traffic Control Awarded project

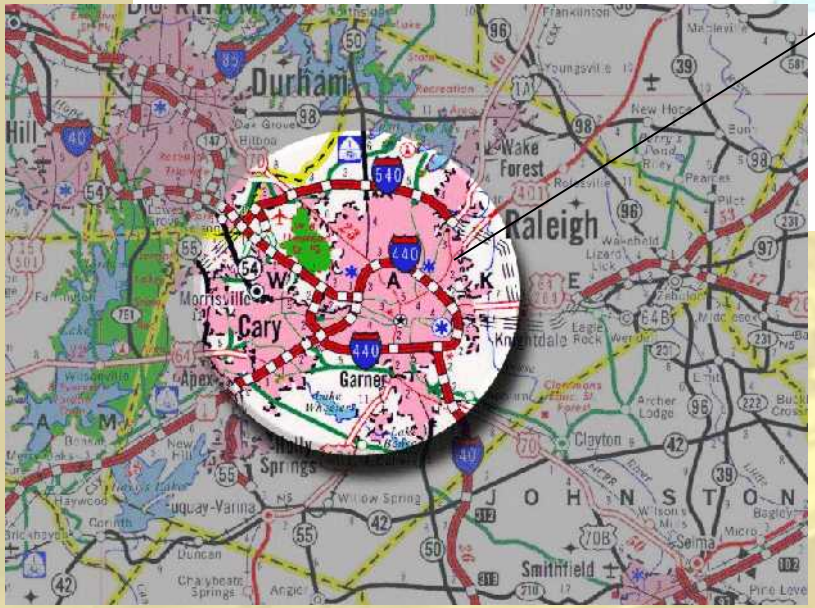
- After the contract is awarded the design review portion begins.
  - Before Construction can begin,
    - The Staging Concept must be reviewed for contract compliance and
    - At a minimum the first phase must be reviewed for compliance and sealed by the team.
  - As construction continues, the Traffic Control plans must show the work being completed in the field.
  - The Design-Build Section provides support to the Field Personnel to help resolve constructability and maintenance of traffic issues.

Benefits to Using Design-Build for Traffic Control

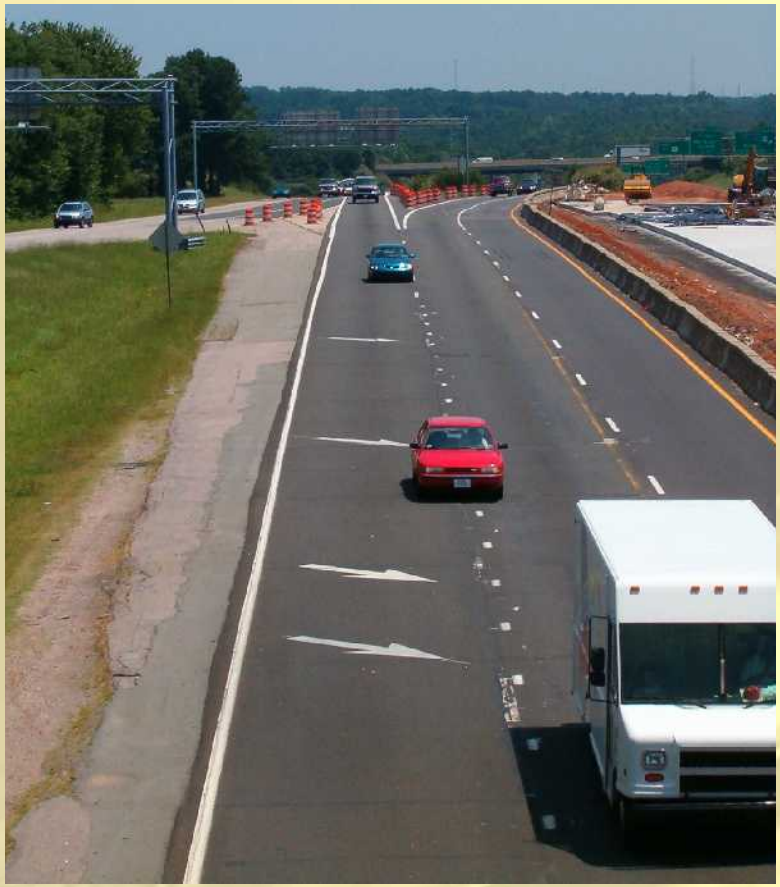
- For Complex projects, it can minimize revisions, value engineering proposals and supplemental agreements. Each contractor will design the TC plan to best fit the resources they plan to use.
- An almost automatic Value Engineering. In order to have the lowest bid, the team needs to show their “cards” prior to letting the project.
- No need for a list of quantities, which allows each team to choose the devices that is most economical to them.
- Allow the team to decide between a couple of options for the final pavement markings.

Key Projects with complex Traffic Control

- U-3101C, US 1/64 in Cary.



- U-3101C, US 1/64 in Cary.
  - Reconstruction and widening of US 1/US 64 in Cary from Tyron Rd to I-440. Widening from 4 lanes to 8 lanes, all Concrete construction.



U-3101C

- Awarded to Lane Construction out of Connecticut, Sepi Engineering for Traffic Control and Pavement Marking Design and IRD for the Smart zone system.
- Key design parameters:
  - High volume of traffic with congestion during most of the day.
  - Maintain 2 lanes in each direction at all times
  - Avoid long back-ups that extend outside the advance warning sign limits.
  - Maintaining traffic operations at Tryon Rd, Walnut St., Cary Parkway and I-440 interchanges.
  - Minimal number of ramp closures
- The current plan is about 90% complete and up to 200 pages of Traffic Control, about 30 Pavement Marking sheets and 8 temporary signal designs.

U-3101C

- The Department has received over 40 different sets of Traffic Controls plans for review.
- The Traffic Control details show traffic devices, roadway design alignments and temporary hydraulic designs when required.
- The Design-Build Section also monitors shop drawing submittals for this project which we have receive about 150 different submittals.

U-3101C

- One Key to Design-Build is Innovative constructing methods

U-3101C

- All Design-Build Projects require Partnering to ensure good efficient teamwork.

U-3101C

- Accidents like this were common prior to construction and a main reason why the project was required to stay on schedule. Utilizing the Design-Build contracting method help keeps the project on schedule.
- Accident reports provided by the **Safety Evaluation Group** show that the number of accident have dropped significantly since construction started.

U-3101C

- Successful notes:
  - Lane Construction provided four CMS boards as part of their bid to help inform traffic within the work zone.
  - Provided the largest Smart Zone deployed in NC
  - Cary Police worked with WZTCU early to make sure that the Advance Warning and speeding penalty sign layout was something they could enforce. Over 300 tickets have been issued by the Town of Cary.
  - For the Winter Holiday Shopping Season of 2005/06, Sepi Engineering designed a pattern that provided more lanes through the winter since the contractor could not start work in the area until the spring time.
  - The team promised no ramp closures would be required. A ramp at Cary Parkway was closed for about 2 weeks, but it was not due to the fact the team couldn’t maintain traffic.

U-3101C

- Successful notes:
  - I have met with Lane, Sepi and the Resident's office several times to help resolve future Traffic Control issues.
  - Partnering, bi-weekly and then monthly partnering meetings have helped resolve issues.
  - Pre-traffic shift meetings are held prior to any traffic pattern shift which include personnel from the Resident's office, Lane, LPA (Contract Inspection), Sepi (Traffic Control designer), the pavement marking contractor and myself.
  - **Safety Evaluation Group** has helped with providing accident information for 2 years prior to the the construction and every quarter after construction started.
    - This information has been used to help monitor how the accident rate changes during construction.

U-3101C

- Not so Successful notes, but learning experiences:
  - The Smart Zone, when operating properly, provided delay information to the motoring public to help them decide how they will travel in the area.
    - Communication problems with the system developed early and the Department had a difficult time trying to get the Design-Build team to correct the issues.
    - Communication problems between devices provided inaccurate information. On three crucial shifts, several pieces of equipment were not working properly and provided inaccurate information.
    - Due to continuing issues with the system, it was cancelled in the spring of this year.
    - In principle, we were hoping that the Contractor, the Traffic Control Design Firm and the Smart Zone vendor would be able to provide an efficient system for each phase of construction.
  - Many states that use Smart zones also keep the item separate from the construction contract and North Carolina will handle Smart zones this way in the future.

U-3101C

- Not so Successful notes, but learning experiences:
  - Temporary Traffic Patterns
    - Compared to the Traffic Control Plan provided in the Technical Proposal, there have been many more traffic shifts than originally planned. This is mainly due to a misjudgment in the subsurface conditions by the Design-Build team. While some shifts have been the result of the Contractor trying to avoid remobilization of subcontractors.
    - In the Future, the Scope of Work will be clear that any change to what was provided in the Technical Proposal and Staging Concept will need to show:
      - Time and/or cost savings to the Department
      - Ensure the change is as safe or safer than what was originally planned.

U-3101C

- Not so Successful notes, but learning experiences:
  - Movable Barrier
    - The Traffic Control Scope of Work provided 30,000’ of movable barrier and 2 transfer vehicles.
    - In theory, lane closures were expected to be used frequently. Lane and Sepi devised a way to build the project minimizing the need for lane closures and the movable barrier was used like regular portable concrete barrier.
    - The Department’s movable barrier and transfer vehicles are also in poor shape, which may also effect the Contractor’s decision on how it’s used. One of the transfer vehicles is being used as spare parts for the other working transfer vehicle.
    - The barrier and vehicles could have been utilized on projects like Clayton Bypass where the movable barrier is being used as it was designed for.

U-3101C

- Not so Successful notes, but learning experiences:
  - Contract requirements not be being followed for ITS installation.
    - Two permanent cameras were required to be installed 90 days after the contract was awarded so they could be used in conjunction with the Smart zone cameras to provide video in the work zone.
    - The cameras were installed about a year after it was awarded. One of the cameras was taken down and is still not working.
  - One solution for future projects would require temporary cameras at the contractor's expense until the proposed cameras are installed.

Key Projects with complex Traffic Control

- I-4401, I-40 in Asheville
  - Reconstruction and Widening of I-40 at the US 19/23 interchange. Widening from 4 lanes to 8 lanes, all concrete reconstruction.

I-4401

- Awarded to Taylor and Murphy Construction and Ko & Associates as the Design Firm for Traffic Control.
- Key design parameters :
  - High volume of traffic with congestion during most of the day.
  - Maintain 2 lanes in each direction at all times
  - No ramp closures
  - Utilize the proposed ITS to inform traffic of changing conditions.
- So far the current traffic control plan is about 25% complete and in early Phase II.
- The Project has been under construction for about 6 months.

I-4401

- Congestion happens daily and one reason why Design-Build was used to keep the project on schedule.

I-4401

- With the Contractors being more involved, they sometimes have a different view on what the message needs to say.

I-4401

- Developing a Scope of Work is sometimes difficult.
  - Two key TC issues with this project were with the large amount of traffic using the US 19/23 interchange and the 12’ grade change above existing elevation made maintaining ramps and loops almost impossible.
    - After several internal meetings prior to advertising the project, the idea of allowing 5 days, 7 days, 30 days, etc. closure of any ramp was denied. There was no feasible detour routes.
    - The Scope of Work was written to not allow any ramp/loop closures and neither team requested a change to allow ramp/loop closures. All ramps and loops will be maintained on the project and the teams bid was still within 10% of the engineer’s estimates.

I-4401

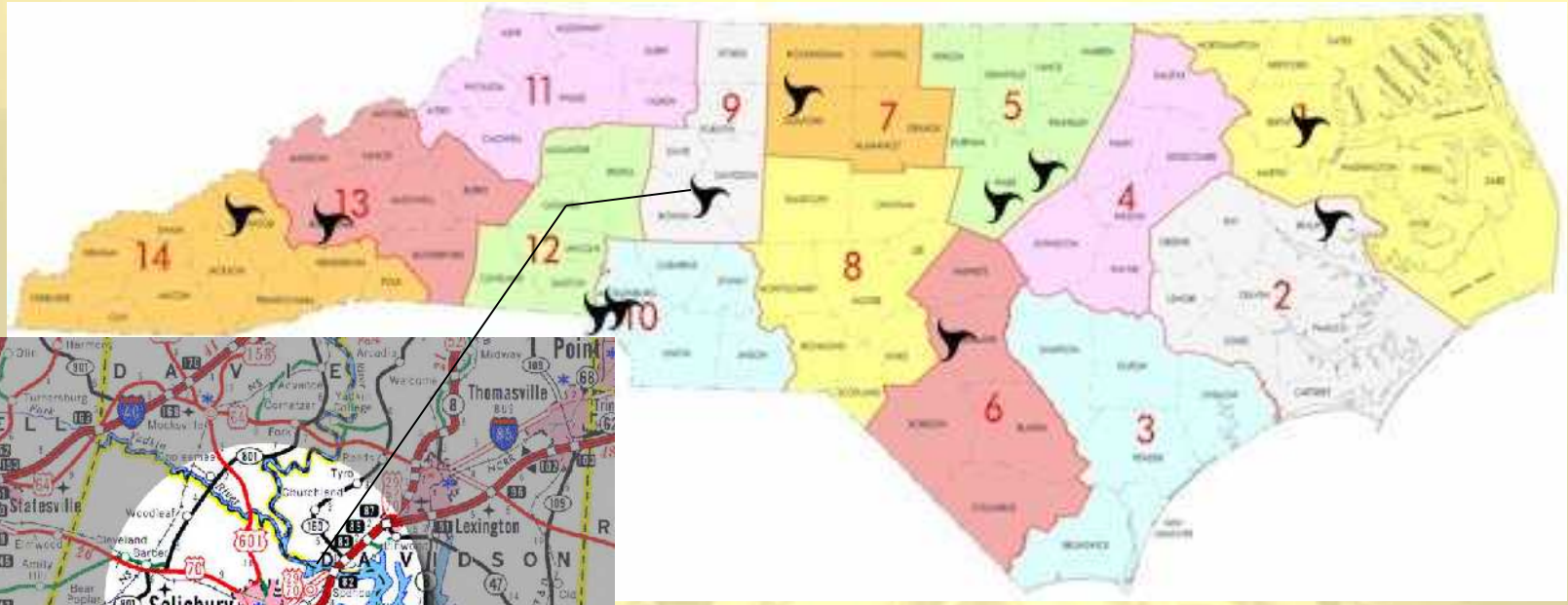
- Before Construction began, Taylor and Murphy requested the use of the following signs. The use was denied for a few reasons, but it was good idea from the team to show innovation in the safety of the project. The Contractor installed the signs on the cranes they have in operation on site.

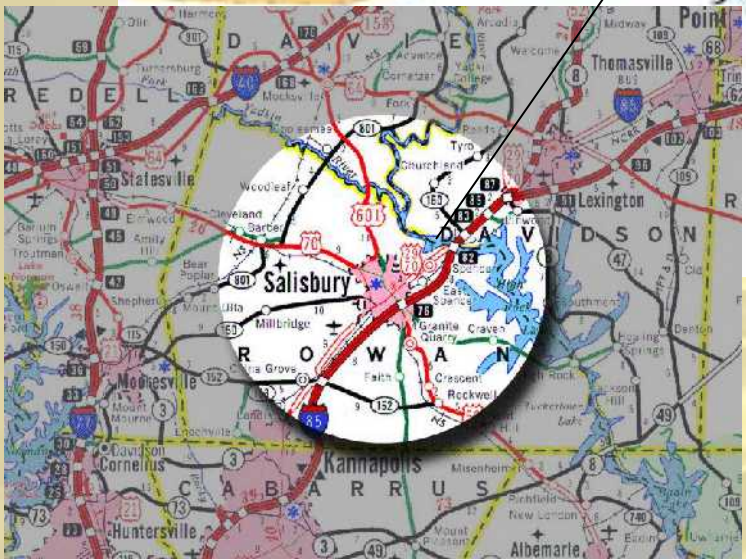
I-4401

- Learning Experiences
  - Like the U-3101C contract, the contract requirements for ITS installation was not followed for a few reasons.
  - Ideally the early installation could help provide information to the motoring public prior to getting to the Work Zone.
  - One solution is to require the contractor to provide CMS boards in the location of the permanent DMS boards at the contractors expense until the proposed ITS equipment is installed.
  - Also, to better utilize the equipment, the Division TMC would need personnel on staff 24/7. Future contracts could help provide funding to provide the staff when needed during the construction of the project.

Key Projects with complex Traffic Control

- I-2511CB, I-85 in Salisbury
  - Reconstruction and Widening of I-85 just east of Salisbury. Widening from 4 lanes to 8 lanes, all Concrete.





I-2511CB

- Awarded to Blythe Construction, LPA and Sepi Engineering.
- Keys issues to the design:
  - High percentage of Truck traffic
  - Maintain 2 lanes in each direction at all times
  - Do not close Old Union Church Road for more than 30 calendar days.
  - No ramp can be closed more than 2 times for up to 7 days.
  - Coordinate Construction with I-2511CA.
- So far the plan is about 40% complete and in early Phase II.
- The Project has been under construction for about a year and a half.

I-2511CB

- This is a picture of the temporary stream relocation which required up to a 30 day closure of Old Union Church Road.

I-2511CB

- During the closure of Old Union Church Road the signing helped make things clear.

I-2511CB

- We still enforce proper signing on Design-Build projects.

I-2511CB

- Towing Contracts have helped motorist transport vehicles to a safer location to change tires.

I-2511CB

- IMAP has also provided a safer helping hand to get vehicles on their way again.

I-2511CB

- Developing a Scope of Work
  - Similar to I-4401, a stream location in combination with the the realignment of Old Union Church Road provide a difficult maintenance of traffic issue to resolve. The Department was sure a road closure would be needed, but did not know for how long.
  - 30 days was provided in the contract, the winning team provided an option that limited the closure to about 5 days. But on the down side, they provided on onsite detour that would make Mario Andretti happy.
  - Project I-2511CA was under construction prior to I-2511CB beginning, by utilizing Design-Build, the Traffic Control plan always matches the changes to I-85 as a result of the construction on I-2511CA. If the plan was developed prior to let, revisions would most likely be required and could result in additional costs to the project.

I-2511CB

- Learning Experiences
  - Some modifications decided on in the field between the Resident Engineer's office and the Contractor were not reflected in the TC plans. This can make it difficult to review future traffic control plans.
  - More clarity in design parameters could have help avoided the Mario Andretti detour issue.

Please save questions to the end of the session.

Thank you